10. After destruction of the axis cylinder and myeline, the fibre appears shrunken on account of the hypertrophy of the endoneurium, the longitudinal fibres of which border on the neurilemma. Within the neurilemma, numerous oval nuclei are arranged in rows.

11. After section and other modes of irritation of nerves, the nuclei of the nerve multiply, and the protoplasm surrounding them is augmented. Tizzoni also saw the nuclei divide into two, three or more pieces by transverse lines of segmentation,

Further details are reserved for a larger publication on the pathology of the nervous system. G.

The following are a few of the most recently published papers on the Pathology of the Nervous System and Mind:

GRAY, Spasmodic Spinal Paralysis, *Proc. Med. Soc. Co. of Kings*, July; FILEHNE, Mellituria from Irritation of the Depressor Nerves in Rabbits, *Centralbl. f. d. Med. Wissensch.*, No. 18; BAUMGARTEN, Hemiopia after Disease of the Occipital Cortex, *Ibid*, No. 21; EISENLOHR, On the Pathological Anatomy of Sclerosis of the Posterior Columns, *Centralbl. f. Nervenheilk.*, No. 6; WEBER, The Nature of Hydrophobia, *Phil. Med. Times*, June 8; MORELLI, Pathological Cases Bearing on the Question of the Existence of Cortical Motor Centres, *Lo Sperimentale*, June; DOUTREBENTE, The Different Kinds of Remissions Occurring in the Course of Progressive General Paralysis, *Ann. Med. Psychol.*, May; JACOBS, Mania Epileptica, *Deutsche Med. Wochenschr.*, June 1; SEGUIN, Lectures on the Localization of Spinal and Cerebral Diseases, *N. Y. Med. Record* (cont. art.); ROBERTSON, Observations on Some Points in Cerebral Pathology and Percussion of the Skull, *Jour. Ment. Sci.*, July; GOWERS, On Some Symptoms of Organic Brain Disease, *Brain*, April; DURET, On the Role of the Dura Mater and its Nerves in Cerebral Traumatism, *Ibid*; MITCHELL, On a Rare Vaso-Motor Neurosis of the Extremities, and on the Maladies with which it may be Confounded, *Am. Jour. of Med. Sci.*, July.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

MORPHIA.—Dr. H. Gibbons, Sr., *Pacific Med. and Surg. Journal*, June, lays down the following rules in regard to the hypodermic administration of morphia:

1. Avoid it in congestion and inflammatory conditions of the brain.
2. Avoid it in pulmonary congestion, and where dyspnœa is not the result of spasm.
3. Avoid it in acute inflammatory affections of the heart and pericardium.
4. Avoid it in high febrile excitement.
5. Avoid puncturing a vein. The effect of introducing morphia in a vein is instantaneous. It is possible that the evil results were due in some

cases to the entrance of the narcotic into a small vein, so small and deep as to escape observation.

6. Avoid a deep puncture, unless there is a special purpose to be accomplished by depositing the narcotic deep in the tissues.

7. Introduce the liquid slowly, and not by sudden projection, as is sometimes done. Spend four or five seconds in driving the piston home.

8. Require the patient to lie down and remain quiet after the operation. There is some risk in moving about, independently of the nausea which follows. The syringe should be used in the patient's chamber, and not in the doctor's office.

I may add, in regard to the appliance in cardiac cases, that according to my experience, there is no condition of human suffering to which it is more applicable than in the agonizing orthopnœa of cardiac asthma. In fact, it is the remedy *par excellence* for the paroxysm of spasmodic asthma, from whatever cause.

STRYCHNIA.—Dr. W. A. Hammond, *St. Louis Clinical Record*, May, recommends in facial paralysis induced by cold, in conjunction with other measures, such as electricity, elastic support, etc., the energetic use of strychnia, employing a solution of one grain to the ounce of water, and beginning the administration with ten minims three times a day, increasing one minim each day until the patient experiences the physiological effects of the remedy in cramps in the limbs or jaw. Then he commences again, if necessary, with the initial dose of ten minims (1-48 gr.). He gives two cases illustrating the success of this method of treatment.

WARM BATHS IN TETANUS.—At the session of the Soc. Méd. des Hopitaux, Jan. 11 (rep. in *L' Union Médicale*), M. Fercol read a report by Dr. Dionis de Carrieres (of Auxerre), of a case of tetanus cured by the use of warm baths prolonged for from two to six hours. This observation supplements two similar ones reported by M. Blachez in the *Gaz. Hebdomadaire* of Jan. 4th, and one case of traumatic tetanus in a German soldier cured by the same means during the Franco-Prussian war, at the same hospital of Auxerre. It was the reminiscence of this case that suggested the treatment in that of Dr. de Carrieres.

ELECTRICITY.—Dr. A. D. Rockwell, *N. Y. Med. Record*, April 6, recommends the use of the methods of central galvanization and general faradization in epilepsy, together with the medicinal treatment, and claims good results in his own experience. Three cases are narrated in which this treatment was employed, and with apparent benefit.

He applies the galvanic current to the brain and sympathetic for not over five minutes, and the alternating *seances* of general faradization are not continued over from five to ten minutes. Large sponges should be employed in preference to smaller ones, which cause a disagreeable concentration of the current.

ELECTRICITY IN INCONTINENCE OF URINE IN CHILDREN.—Dr. Arthur Kemble, *Boston Med. and Surg. Journal*, April 25, in the cases of atony of the sphincter vesicæ, which are the result of long-continued morbid sensibility of the neck of the bladder, and accompanied with incontinence of urine, uses electrization (faradization) of the sphincter by means of conical-pointed electrodes introduced into the bladder, and then withdrawn just so far that its enlarged extremity is grasped by the muscle. The other button-shaped electrode may be placed on the pubis, and a mild current from a pocket Gaiffe battery is sufficient for the purpose. In the cases in which he has employed this treatment he has seen decided benefit result.

PHYSOSTIGMA.—Sidney Ringer, *Lancet* (Am. repr.), March, gives an account of four cases of paraplegia, two of locomotor ataxy, and one of writer's cramp, which were treated with small doses of physostigma, one-tenth of a grain, or less of the extract, taken at frequent intervals. Improvement was observed in three of the cases of paraplegia, though two of these afterwards relapsed; both the cases of ataxy and the case of writer's cramp were cured. In spite of the comparatively poor results, Dr. Ringer thinks that physostigma will be found useful in some forms of paraplegia, before the disease has had time to disorganize the cord.

NITRITE OF AMYL.—Dr. W. S. Forbes, *Hays' Jour.*, April, reports two cases of hydrophobia in which great relief was afforded by inhalations of nitrite of amyl. The patients were enabled to eat and drink with comfort, and enjoyed refreshing sleep after the inhalations. Death, however, finally occurred during convulsions. The doses used were large — twenty-four drops to a teaspoonful at one administration.

BROMIDE OF AMMONIUM.—The following are the conclusions deduced by Dr. L. Brechemin, *Phil. Med. Times*, March 30, from his experiments on the physiological action of bromide of ammonium, performed mostly on frogs, but also, to some extent, on rabbits and pigeons:

1. The convulsions produced by poisonous doses of bromide of ammonium are spinal.
2. Bromide of ammonium produces paralysis of the receptive tract of the spinal cord—that is, of the part which receives and transmits impressions—and of the peripheral ends of the afferent or sensory nerves.
3. Death is produced by asphyxia.
4. The action of bromide of ammonium on the nervous system is therefore identical with that of bromide of potassium.

MAGNETS AND STATIC ELECTRICITY IN HYSTERICAL ANÆSTHESIA.—At the Soc. de Biologie, March 16 (rep. in *Gaz. des Hopitaux*, No. 33), M. Romain Vigouroux gave an account of some experiments performed at the Salpêtrière by invitation of M. Charcot. The following are the principal results: A steel bar magnet, held at a distance of many millimetres from an anæsthetic part, recalled the sensibility in a time rarely exceeding ten minutes. It makes no difference whether both poles or either one of them is presented, the result is the same.

As a counter proof, if we present the centre of the bar no effect is produced.

This effect has been noted as well in cutaneous anæsthesia as in that of the organs of sense.

The effects observed have a great analogy to those from the metallic applications of M. Burq (increase of muscular power, return of sensibility).

It appears probable that magnets, which played a great part in the therapeutics of the last century, should be rehabilitated with more precise indications.

M. Romain Vigouroux next reported two experiments upon patients with static electricity, using the dielectric machine of Carré. The patients having been placed on an isolated stool, under the influence of moderate discharges, the sensibility was seen to return and become generalized more rapidly than by any other means. This goes to confirm the *role* attributed by M. Vigouroux to the electric tension in the phenomena produced in hysterical patients by metallic applications, continued currents, etc. (*Gaz. des Hop.*, Nov. 17, 1877.)

ERGOT.—At the session of the Soc. de Biologie, March 2 (rep. in *Gaz. des Hopitaux*), M. Laborde stated that he had made a series of experiments with ergotine from various sources, especially the ergotine of Bonjean, the ergotine of Tanret, the ergotine of Wiggers, that of Yvon, etc. If we inject into the ear of a rabbit a gramme of Bonjean ergotine, or a centigramme of ergotine of Tanret (this latter being much the most active), we see at once the commencement of an anæmia in that ear, reducing the vessels to their minimum calibre, and we find the temperature of the ear decreased at least four degrees centigrade. If the same injection is made into a rabbit's ear after section of the great sympathetic, the same phenomenon is produced. It is, therefore, on the muscular fibre of the vessel itself, rather than on the nervous system, that ergot exerts its action.

ANTAGONISM OF ACONITE AND DIGITALIS.—The following is the general summary of a recent memoir by Dr. J. Milner Fothergill, on the antagonism of aconite and digitalis, concluded in the *British Medical Journal*, May 4:

1. The minimum lethal dose of Morson's aconitine for a Guinea pig of 1½ lbs. weight is 1-1200th of a grain; for a rabbit of 1½ lbs. weight, 1-400th of a grain; for a 3 lb. rabbit, 1-300th of a grain; the difference being due, probably, rather to age than to size. The younger rabbit took a comparatively larger dose.

2. The minimum lethal dose of digitaline (Smith's) is nearly one grain to the pound weight in the rabbit.

3. The simultaneous administration of digitaline and aconitine affords no protection.

4. If digitalis be given in sufficient dose and a sufficient time (from five to nine hours) before a lethal dose of aconitine is administered, a distinct protection is afforded.

5. When the digitaline is given at a less interval than five hours, the toxic power of aconitine is intensified.

6. Small doses of atropine given before lethal doses of aconitine exercise a decided protective influence.

7. Small doses of aconitine do not appear to exercise any influence over lethal doses of atropine.

8. Atropine in four-grain doses effectually antagonizes lethal doses of aconitine, up to sixteen minutes after the administration of the latter.

9. Atropine exercises no like influence over lethal doses of chloral.

10. Strychnia exercises a potent influence over lethal doses of aconitine, but the experiments are too few to warrant very decided conclusions.

NICOTINE.—The following are the general results of an extended series of experiments by M. Albert René, of Nancy, as reported in the *Gaz. des Hopitaux*, No. 52.

The experiments were principally directed to the following points: The routes of absorption, the action on the muscles, the nervous system (motor and sensory nerves, and nerve centres), the respiration and the blood.

Nicotine may enter the system through all the ordinary methods of absorption, the gastric and intestinal mucous surfaces, the conjunctivæ, by hypodermic, intravenous, or intraglandular injections, and by the respiratory passages, and the characteristic symptoms of poisoning are observed in all. By the mouth its action is more rapid than by simple hypodermic injection, but intravenous injection produces very sudden results.

The toxic dose varies somewhat from unappreciable causes. Generally it is not exactly proportional to the weight of the animal. The most important point, considering the rapidity of its elimination, is the absolute amount of the poison introduced into the system at a given moment, and this quick elimination explains to a certain degree the tolerance of the substance often noticed.

The direct effect of nicotine is to destroy or diminish the muscular contractility. The poisoned muscle loses in a few moments, more or less completely, the power of contracting, under the influence of the galvanic current, as well as from nervous stimulus; the nerves themselves are, moreover, very rapidly paralyzed. M. René remarks that the muscular paralysis is not due to that of the motor nerves, but is a true paralysis of the muscular fibre due to the direct local action of the nicotine. Nervous motricity is destroyed at the commencement of the poisoning, even before the loss of muscular contractility.

Nicotine acts also on the sensibility; it enfeebles or destroys it.

But it is the central nervous system that is first affected by this agent, which acts at once from it on all parts of the motor nerves. Convulsions are the first indications of excitation of the nerve centres. They consist in a general tremor, analogous to that of an intense chill. It is a veritable vibration of muscular waves; a tremor of each muscle, or better, of each muscular fibre. In place of the fusion of contractions, which results in a contraction of all the muscle, there is a tetanic succession of all the contractions that ought to blend in a single one.

The excitation of the cord at the commencement of the poisoning, especially by small doses, and giving rise to an exaggeration of reflex power, speedily disappears, to be replaced by paralysis. The period of excitation and convulsions is very short. The reflex power of the cord lasts a little longer, then it, like the sensibility, the excito-motor faculty of the nerves, and the muscular contractility, is also abolished.

The initial excitation of the nerve centres by nicotine extends also to the respiratory centre in the medulla. Respiration is accelerated by small doses, and becomes slower, again, after a longer or shorter time of excitation. In becoming slower it also becomes fuller and stronger. After a few moments a convulsive cramp occurs at the end of expiration, and in this the animal may succumb. It is ordinarily the expiration that is more troubled than the inspiration. The retardation of the respiration augments progressively.

If the animal does not die during the expiratory convulsion, it succumbs finally to arrest of the respiration and the circulation due to the general depression of these systems.

In the autopsies, M. René observed only occasional nuclei of congestion in the lungs and hyperæmia of the brain, and especially of the cerebellum. These authorize no conclusion as to the mode of action of the poison.

Finally, it follows from M. René's experiments, that nicotine has no effect on fermentation, on artificial digestion, or on putrefaction, and that there is no antidote except elimination.

The action on the heart and vessels is to be taken up hereafter.

THE CHINOLINE AND PYRIDINE BASES.—Dr. J. G. McKendrick, *British Medical Journal*, May 4, published a report of a series of investigations undertaken to determine, (1) the physiological action of the various members of the pyridine and chinoline series of bases ; (2) whether there was any difference between the action of these bases derived from cinchonine and the isomeric ones derived from tar ; (3) whether, if so, how, both as regards extent and character, the physiological action of these bases differed from that of the original alkaloidal bodies ; (4) whether the action of the methyl and ethyl compounds of the substances was different from that of the substances themselves ; and (5) whether any facts could be ascertained generally which would throw light on the interesting problem of the relation between the chemical constitution of active substances and their physiological action.

After giving a statement of the chemical relations of the series, he gives in detail his experiments, which were chiefly made upon rabbits, though other animals up to man were also employed. The physiological action seemed, however, to be similar on all. These investigations have been extended over four or five years, and a summary of the conclusions reached at an early period of the research was published in this journal for October, 1875. The following is the latest summary contained in the present report:

1. There is a marked gradation in the extent of physiological action of the members of the pyridine series of bases, but it remains of the same kind. The lethal dose, however, becomes reduced as we rise from the lower to the higher.

The higher members of the pyridine series resemble, in physiological action, the lower members of the chinoline series, except (1) that the former are more liable to cause death by asphyxia, and (2) that the lethal dose of the pyridines is less than one-half that of the chinolines.

3. In proceeding from the lower to the higher members of the chinoline series, the physiological action changes in character, inasmuch as the lower members appear to act chiefly on the sensory centres of the encephalon and the reflex centres of the spinal cord, destroying the power of voluntary or reflex movement; while the higher act less on these centres, and chiefly on the motor centres, first as irritants, causing violent convulsions, and afterwards producing complete paralysis. At the same time, while the reflex activity of the centres in the spinal cord appears to be so far inactive as not to be excited by pinching or pricking, it may be readily roused to action by strychnine. These conclusions apply especially to rabbits; in animals of higher cerebral development, such as dogs, monkeys, and man, nausea and vomiting are produced in addition.

4. On comparing the action of such bases as $C_9 H_7 N$. (chinoline) with $C_9 H_{13} N$. (parvoline), or $C_8 H_{11} N$. (collidine), with $C_8 H_{15} N$. (conia from hemlock), or $C_{10} H_{10} N_2$ (dipyridine) with $C_{10} H_{14} N_2$ (nicotine from tobacco), it is to be observed that, apart from differences in chemical structure, the physiological activity is greater in those bases containing the larger amount of hydrogen.

5. Those artificial bases which approximately approach the percentage composition of natural basis are much weaker physiologically, so far as can be estimated by amount of dose, than the natural bases; but the kind of action is the same in both cases.

6. When the bases of the pyridine series are doubled by condensation, producing polymeric compounds such as dipyridine, dipicoline, etc., they not only become more active physiologically, but the action differs in kind from that of the simple bases, and resembles the action of natural bases or alkaloids having an approximately similar chemical composition.

7. All the substances examined in this research are remarkable for not possessing any specific paralytic action on the heart likely to cause syncope; but they destroy life, in lethal doses, either by exhaustive convulsions or by gradual paralysis of the centres of respiration, thus causing asphyxia.

8. There is no immediate action on the sympathetic system of nerves, although there is probably a secondary action, because after large doses the vaso-motor centre, in common with other centres, becomes involved.

9. There is no appreciable difference between the physiological action of the bases derived from cinchona and those derived from tar.

10. The union of methyl, ethyl, amyl and allyl with chinoline did not entirely change its characteristic mode of action, but their presence caused, along with stupor, a tendency to spasm and convulsion. Also, in the case of the pyridine and picoline addition-compounds, increase in molecular complexity and weight, while it does not entirely change the mode of action of the simpler compound, is always attended by a tendency to spasm and convulsion, probably arising from irritation of cerebral motor centres.

11. The nature of the acid with which these compounds were combined did not appear materially to affect the physiological action, which apparently depended on the nature of the base. As a rule, bromides and iodides were more potent than chlorides or sulphates. No difference of effect could

be observed between the iodine and bromine compounds of the addition-derivatives.

12. Dicarbopyredenic acid ($C_7 H_5 NO_4$), the only substance containing oxygen we have examined, is remarkable for rapidity and potency of physiological action; it also acts rapidly on the vaso-motor centres. In containing oxygen it has a nearer resemblance in percentage composition to several alkaloids than any of the chinoline or pyridine compounds.

13. Substances having the same percentage chemical composition, but a different chemical structure, may have different physiological effects. Contrast lepidine with methyl-chinoline, dispoline with ethyl-chinoline, isoline with amyl-chinoline, and quinine with cinchonine.

14. Substances which have an action on the cerebral portion of the nervous system will act on animals differently, according to the degree of their cerebral development. Thus, chinoline causes in the dog, cat, and monkey, excitement and nausea and vomiting antecedent to stupor and anæsthesia; while in the rabbit none of these phenomena occur.

It is understood that several of these conclusions are merely tentative, and may require to be modified on future investigation.

HYPOPHOSPHITE OF ZINC.—R. W. Gardner, *N. Y. Med. Record*, proposes the use of hypophosphite of zinc as a substitute for the phosphide of zinc in therapeutics. Its advantages he claims are its containing phosphorus in the state of the protoxide, in which condition it is "rendered non-irritant, admitting the use of such quantities as to fully meet all indications for either phosphorus or zinc, and that being readily soluble it is readily assimilated." He recommends it in the form of syrup, and says that it has been therapeutically tested with very satisfactory results.

As to the advantages of this preparation which are claimed by the author over phosphide of zinc, that it contains a larger proportion of phosphorus, we are somewhat in doubt, as it appears to us that enough for all practical purposes of such an active agent may be administered in the latter combination. Still we shall wait to hear of further therapeutical investigations in regard to the hypophosphite.

PHYSIOLOGICAL ACTION OF LYCOCTONIA, NAPELLINA AND ACONITIA.—The following conclusions in regard to the physiological actions of lycoctonia, napellina and aconitia, are given at the conclusion of a lengthy paper by J. Munro Murray, Asst. Surg., U. S. N., published in *Philadelphia Med. Times*, May 11th and 25th:

ACONITIA.

1. Aconitia is a powerful toxic agent.
2. It kills mainly through the respiratory apparatus.
3. It paralyzes the motor nerves.
4. It paralyzes, first the sensory nerve ends, then the nerve trunks and spinal sensory ganglia, and does not affect the striated muscles.
5. It reduces the arterial tension and pulse, with a decided primary rise of the former.

6. The pulse and pressure changes are due to an action on the intra-cardiac nervous apparatus.
7. The vagi are paralyzed by small doses.
8. The delirium cordis is due to a change in the nervous mechanism of the heart.
9. It paralyzes the heart of batrachians.

NAPELLINA.

1. Is a weaker toxicant than aconitia.
2. Same as aconitia.
3. Same as aconitia.
4. Same as aconitia.
5. Same as aconitia.
6. Same as aconitia.
7. The vagi are paralyzed by medium doses.
8. Same as aconitia.
9. It does not poison the heart of batrachians.

LYCOCTÓNIA.

1. Lycoctonia is a weaker toxicant than either aconitia or napellina.
2. The same as aconitia.
3. The same as aconitia.
4. It does not affect sensory nerves, spinal cord, or striated muscles.
5. It reduces arterial tension and pulse without any primary rise.
6. ——.
7. The vagi are only paralyzed by large doses.
8. Same as aconitia.
9. It does not paralyze the heart of batrachians.

The following are some of the articles recently published on the Therapeutics of the Nervous System and Mind:

OHMS, On Muriate of Pilocarpine, *St. Petersburg Med. Wochenschrift*, No. 6; GUAITA, Metallotherapy and its Application in Diseases of Children, *Lo Sperimentale*, April; MACKENZIE, On Some Indications for the Use of Digitalis in Acute Mental Disorders, *Jour. of Ment. Sci.*, July; LENTE, Treatment of the Vomiting of Pregnancy, *N. Y. Med. Record*, June 22; BEARD, The Nature and Treatment of Inebriety, *Quarterly Jour. of Inebriety*, June; MOSLER, On the Local Treatment of the Meningeal Affections in Acute Rheumatism, *Deutsche Med. Wochenschr.*, Nos. 23 and 24; EULENBERG, On Metallotherapie, *Ibid*, No. 25; WEBER, Belladonna as a Stimulant to the Circulatory System, *Philadelphia Med. Times*, July 6.